

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Sei-Hyung Ryu

Serial No.: To Be Assigned

Filed: Concurrently Herewith

For: MULTIPLE FLOATING GUARD RING EDGE TERMINATION FOR SILICON CARBIDE
DEVICES AND METHODS OF FABRICATING SILICON CARBIDE DEVICES
INCORPORATING SAME

Date: December 9, 2003

Mail Stop Patent Application
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97(b)


Sir:

Attached is a list of documents on Form PTO-1449, together with a copy of any listed foreign patent document and/or non-patent literature. A copy of any listed U.S. patent and/or U.S. patent application publication is not provided herewith in accordance with the waiver by the U.S. Patent and Trademark Office of requirements under 37 C.F.R. § 1.98(a)(2)(i) for all U.S. national patent applications filed after June 30, 2003 and for all international applications that have entered the national stage under 35 USC § 371 after June 30, 2003.

It is requested that these documents be considered by the Examiner and officially made of record in accordance with the provisions of 37 C.F.R. § 1.56 and Section 609 of the MPEP.

No fee is believed due. However, the Commissioner is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-0220.

Respectfully submitted,



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Date of Deposit: December 9, 2003

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Traci A. Brown

FORM PTO-1449 U.S. Department of Commerce Patent and Trademark Office LIST OF DOCUMENTS CITED BY APPLICANT (Use several sheets if necessary)				Attorney Docket Number 5308-278		Serial No. To be assigned	
				Applicants: Ryu et al.			
				Filing Date: Concurrently herewith		Group: Unknown	
U. S. PATENT DOCUMENTS							
Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date if Appropriate
	1	3,047,439	07/31/62	H.J. Van Daal et al.			
	2	3,121,829	02/18/64	A. Huizing et al.			
	3	3,628,187	12/04/71	DeLoach, Jr. et al.	331	107	
	4	4,096,622	06/27/78	MacIver	29	573	
	5	4,329,699	05/11/82	Ishihara et al.	357	2	
	6	4,607,270	08/19/86	Iesaka	357	15	
	7	4,638,551	01/27/87	Einthoven	29	571	1
	8	4,720,734	04/19/88	Amemiya et al.	357	15	
	9	4,738,937	04/19/88	Parsons	437	180	
	10	4,742,377	05/03/88	Einthoven	357	15	
	11	4,762,806	08/09/88	Suzuki et al.	438	100	
	12	4,765,845	08/23/88	Takada et al.	136	258	
	13	4,816,879	03/28/89	Ellwanger	357	15	
	14	4,866,005	09/12/89	Davis et al.	437	180	
	15	4,875,083	10/17/89	Palmour	357	23.6	
	16	4,901,120	2/13/90	Weaver et al.	357	15	
	17	4,907,040	03/06/90	Kobayashi et al.	357	4	
	18	4,918,497	04/17/90	Edmond	357	17	
	19	5,471,072	11/28/95	Papanicolaou	257	77	
	20	5,712,502	1/27/98	Mitlehner	257	341	
	21	5,789,311	8/4/98	Ueno et al.	438	573	
	22	5,801,836	08/01/98	Bakowski et al.	257	487	
	23	5,907,179	05/25/99	Losehand et al.	257	475	
	24	5,914,500	06/22/99	Bakowski et al.	257	77	
	25	5,932,894	08/03/99	Bakowski et al.	257	76	

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Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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					Filing Date: Concurrently herewith		Group: Unknown	
	26	5,977,605	11/02/99	Bakowsky et al.	257	496		
	27	6,002,159	12/14/99	Bakowski et al.	257	493		
	28	6,005,261	12/21/99	Konstantinov	257	77		
	29	6,040,237	03/21/00	Bakowski et al.	438	521		
	30	6,083,814	07/4/00	Nilsson et al.	438	519		
	31	6,110,813	08/29/00	Ota et al.	438	597		
	32	6,191,015 B1	02/20/01	Losehand et al.	438	570		
	33	6,313,482 B1	11/6/01	Baliga	257	77		
	33	6,320,205 B1	11/20/01	Pfirsch et al.	257	77		
	35	6,573,128 B1	06/03/03	Singh	438	167		
FOREIGN PATENT DOCUMENTS								
		Document Number	Date	Country	Class	Subclass	Translation Yes No	
	36	WO97/087 54	03/06/97	PCT				
	37	63-133569	06/06/88	Japan				
	38	62-279672	06/06/88	Japan				
	39	58-148469	03/09/83	Japan				
	40	EP111168 8A1	06/27/01	EPO				
	41	WO 96/03774	02/08/96	PCT				
	42	Katsunori Ueno, Tatsue Urushidani, Kouichi Hahimoto, and Yasukazu Seki. "The Guard -Ring Termination for the High-Voltage SiC Schottky Barrier Diodes." <i>IEEE Electron Device Letters</i> . Vol. 16. No. 7, July 1995.						
	43	Singh, R. and J.W. Palmour, "Planar Terminations in 4H-SiC Schottky Diodes with Low Leakage and High Yields," <i>IEEE International Symposium on Power Semiconductor Devices and ICs</i> , 1997.						

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		Applicants: Ryu et al.	
		Filing Date: Concurrently herewith	Group: Unknown
	44	Kosiachenko, L.A. and E.F. Kukhta, V.M. Skiliarchuk, "Light Emission from Metal at Forward Bias of a Shottky Diode," <i>Zhurnal tekhnicheskoi fiziki [Journal of Technical Physics]</i> , Vol. 54, No. 6, 1984.	
	45	Kyoritsu Shuppan Kabushiki Kaisha, <i>Crystallography Handbook</i>	
	46	<i>The Electrical Engineering Handbook</i> , Richard C. Dorf, editor, Second Edition, CRC/IEEE Press.	
	47	Sze, S.M. <i>Physics of Semiconductor Devices</i> , John Wiley & Sons, p. 250-254.	
	48	Streetman, B.G. <i>Solid State Electronic Devices</i> . Second Edition, Prentice-Hall, 1980, pp. 192-3, 201, 443	
	49	Saidov, M.S., Kh. A. Shamuratov, and A. Umurzakov. "Current-voltage characteristics of silicon carbide heterojunctions." <i>Soviet Physics of Semiconductors</i> . Vol. 13, No. 9, September, 1979, pp. 1054-1056.	
	50	Pelletier, J., D. Gervais, and C. Pomot. "Application of Wide Gap Semiconductors to Surface Ionization: Work Functions of AlN and SiC Crystals." <i>Journal of Applied Physics</i> . Vol. 55, No. 4. February 15, 1984, pp. 994-1002.	
	51	Edmond, J.A., J. Ryu, J.T. Glass, and R.F. Davis. "Electrical Contacts to Beta Silicon Carbide Thin Films." <i>Journal of the Electromechanical Society</i> . Vol. 135, No. 2, February 1988, pp. 359-362.	
	52	Waldrop, J.R. and R.W. Grant. "Formation and Schottky barrier height of metal contacts to β -SiC." <i>Applied Physics Letters</i> . Vol. 56, No. 6, February 5, 1990, pp. 557-559.	
	53	Ioannou, D.E. and N.A. Papanicolaou. "Deep Level Transient Spectroscopy of β -SiC Layers." <i>Abstracts</i> . Fourth National Review Meeting On Growth and Characterization of SiC and Its Employment in Semiconductor Applications.	
	54	Anikin, M.M. et al. "Electrostatic properties of SiC-6H structures with an abrupt pin junction," <i>Soviet Physics Semiconductors</i> . Jan. 1988, Vol. 22(1): pp. 80-83.	
	55	Glover, G.H. "Charge Multiplication in Au-SiC (6H) Schottky Junctions." <i>Journal of Applied Physics</i> . November, 1975, Vol. 46, No. 11: pp. 4842-4844	
	56	Ioannou et al. "The Effect of Heat Treatment on Au Schottky Contacts on β -SiC." <i>IEEE Transactions on Electron Devices</i> . August, 1979, Vol. Ed-34, No. 8: pp. 1694-1699.	
	57	Violin, E.E., et al. "Light Emitting Devices Based on Silicon Carbide." <i>Silicon Carbide</i> . 1973, p. 565. (edited by Marshall, Faust, Ryan).	
	58	Powell, J.A. "Silicon Carbide: Progress in Crystal Growth." <i>Material Research Society Symposium Proceedings</i> . 1987, Vol. 97: pp.159-168.	
	59	Konstantinov, A.O. "Ionization Rates and Critical Fields in 4H Silicon Carbide," <i>Appl. Phys. Lett.</i> Vol. 71, No. 1, July 1997, pp. 90-92.	
	60	Appels et al. "High-voltage thin layer devices (RESURF devices)," <i>IEDM Tech. Dig.</i> , 1979, pp. 238-41.	
	61	Li et al. "Theoretical and Experimental Study of 4H-SiC Junction Edge Termination," <i>Materials Science Forum</i> , Vols. 338-342 (2000), pp. 1375-8.	
	62	Merchant et al. "Realization of High Breakdown Voltage (>700V) in Thin SOI Devices," <i>Tech. Digest of ISPSD '91</i> , pp. 31-4.	
	63	Yilmaz, Hamza, "Optimization and Surface Charge Sensitivity of High Voltage Blocking Structures with Shallow Junctions," <i>IEEE Transactions on Electron Devices</i> , Vol. 38, No. 3, July 1991, pp. 1666-75.	

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